

Point-To-Point Wiring & Signal Tracing

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Announcement

The Tools For Decision (TFD) Group will now provide the P2P Wiring & Signal Tracing products previously offered by Northrop Grumman.

The TFD Group has employed the core Northrop Grumman development team to ensure continued delivery of high quality products to our DoD customers.

Additionally, the TFD Group, SASI, and 4-Ward Tech, Inc. are in the process of teaming to provide the DoD with rapid, high quality P2P Wiring & Signal Tracing solutions and technical data conversion services in various digital formats.

Point-to-Point Wiring

U.S. Army Point-To-Point Development

Provide the maintainer with an intelligent means of viewing and controlling complex electrical, hydraulic, and pneumatic schematics integrated within the troubleshooting procedures of the EMS IETM

Incorporate a capability to train the maintainer in the operation of circuit components in a “just in time” or “distance learning” environment

Provide a diagnostic function to allow the maintainer to measure expected voltage, fluid flow, or air pressure, under normal operation, consistent with the current component configuration display

Point-to-Point Wiring

U.S. Army Vehicle P2P Wiring & Signal Tracing

4
16



Requirements

- Present PTP circuit diagrams in a discrete, single-function format.
- Impart knowledge of normal circuit operation to the maintainer
- Allow users to change and store the state of electro-mechanical symbols, such as switches, circuit breakers, relays, and hydraulic or pneumatic valves, throughout the current vehicle PTP session.
- Provide trace displays for electrical current flow, fluid flow, or air pressure flow fully dependent upon current electro-mechanical component configuration.
- Present integrated information for component/circuit theory, vehicle model number, and component location.
- Provide an interactive diagnostic function (meter) for each displayed circuit.
- Provide stand-alone operation or operation integrated with the EMS IETM troubleshooting and maintenance procedures
- Create and provide single-point access to overall vehicle switch configuration logic.
- Apply animation techniques to further impart knowledge of vehicle component operation.
- Create links within each multi-function display as necessary to continue access to information appropriate to the operation of the current function under view.
- Provide an interactive list of the 5 previously linked circuits within each PTP session.
- Indicate point-of-entry for each wire code or hose number when linking from one circuit to another.
- Apply links to a navigation menu (browse) that permit random access to all available circuit displays within the system area currently accessed by the user.
- Provide an integrated linking capability that allows the user to drill down to selected maintenance procedures (Remove, Replace, and RSPTL) within the EMS IETM.
- Link to legend displays depicting generic nomenclature symbols for electrical, hydraulic, and pneumatic components used within the selected vehicle PTP circuits.
- Provide TRACE legends for each circuit type.
- HELP file assistance for PTP operation is required.

U.S. Army Vehicle P2P Wiring & Signal Tracing



Current TACOM Vehicle Implementation List

Vehicle

Date

Palletized Loading System (PLS)*

-

9/00

Medium Tactical Vehicle Replacement (MTVR)**

9/01

High Mobility Multipurpose Wheeled Vehicle (HMMWV)*

7/02

Heavy Equipment Transporter (HET)

8/02

Field Artillery Ammunition Support Vehicle (FAASV)

-

3/03

M939 Family of Vehicles

-

4/03

M915 Family of Vehicles (partial)

-

9/03

Heavy Expanded Mobility Tactical Truck (HEMTT)

- Draft

2/04

-

Point-to-Point Wiring

Includes embedded training enhancement

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USMC 7 Ton

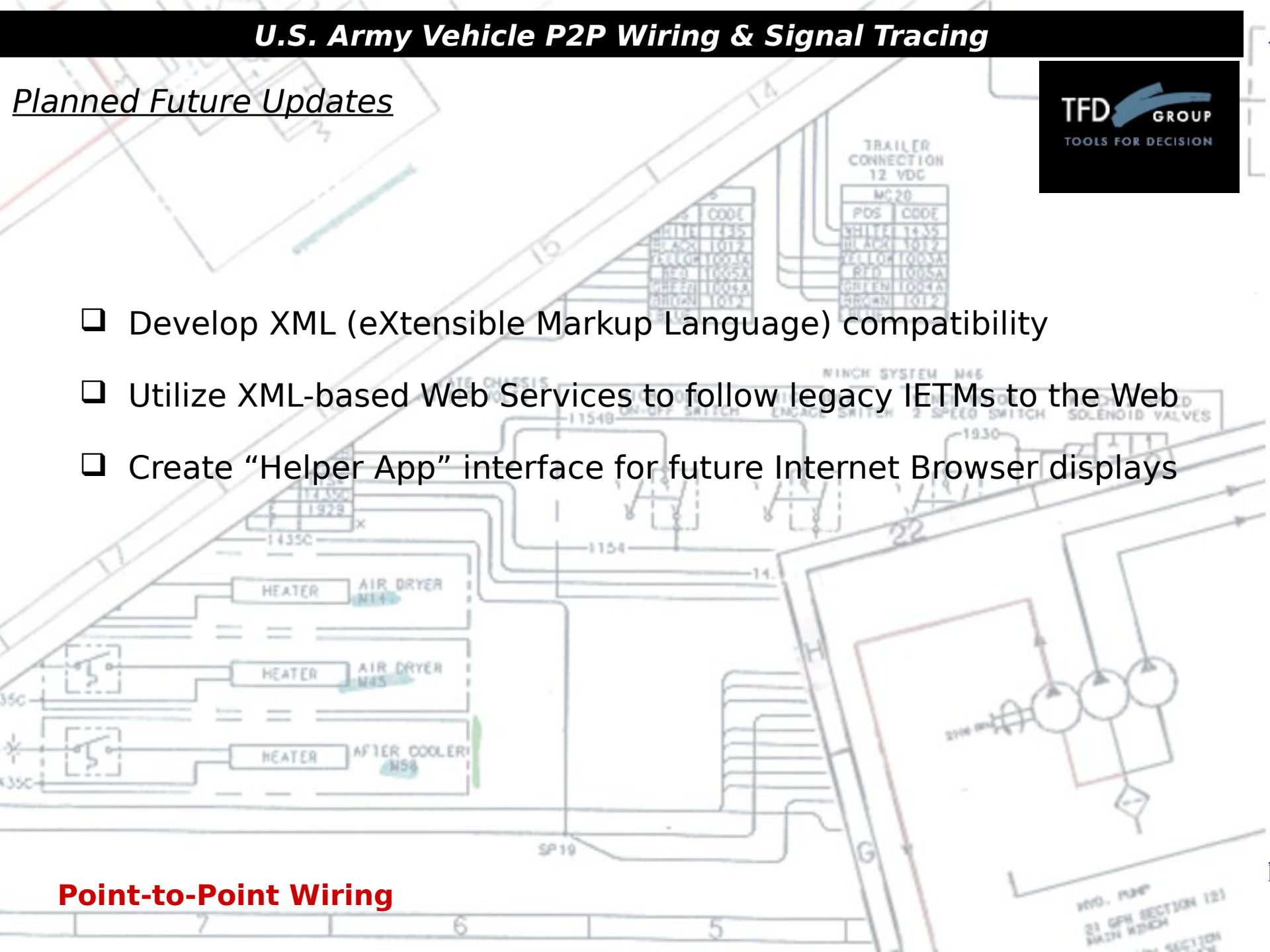
U.S. Army Vehicle P2P Wiring & Signal Tracing



Planned Future Updates

- ❑ Develop XML (eXtensible Markup Language) compatibility
- ❑ Utilize XML-based Web Services to follow legacy IETMs to the Web
- ❑ Create “Helper App” interface for future Internet Browser displays

Point-to-Point Wiring



U.S. Army Vehicle P2P Wiring & Signal Tracing



Feedback

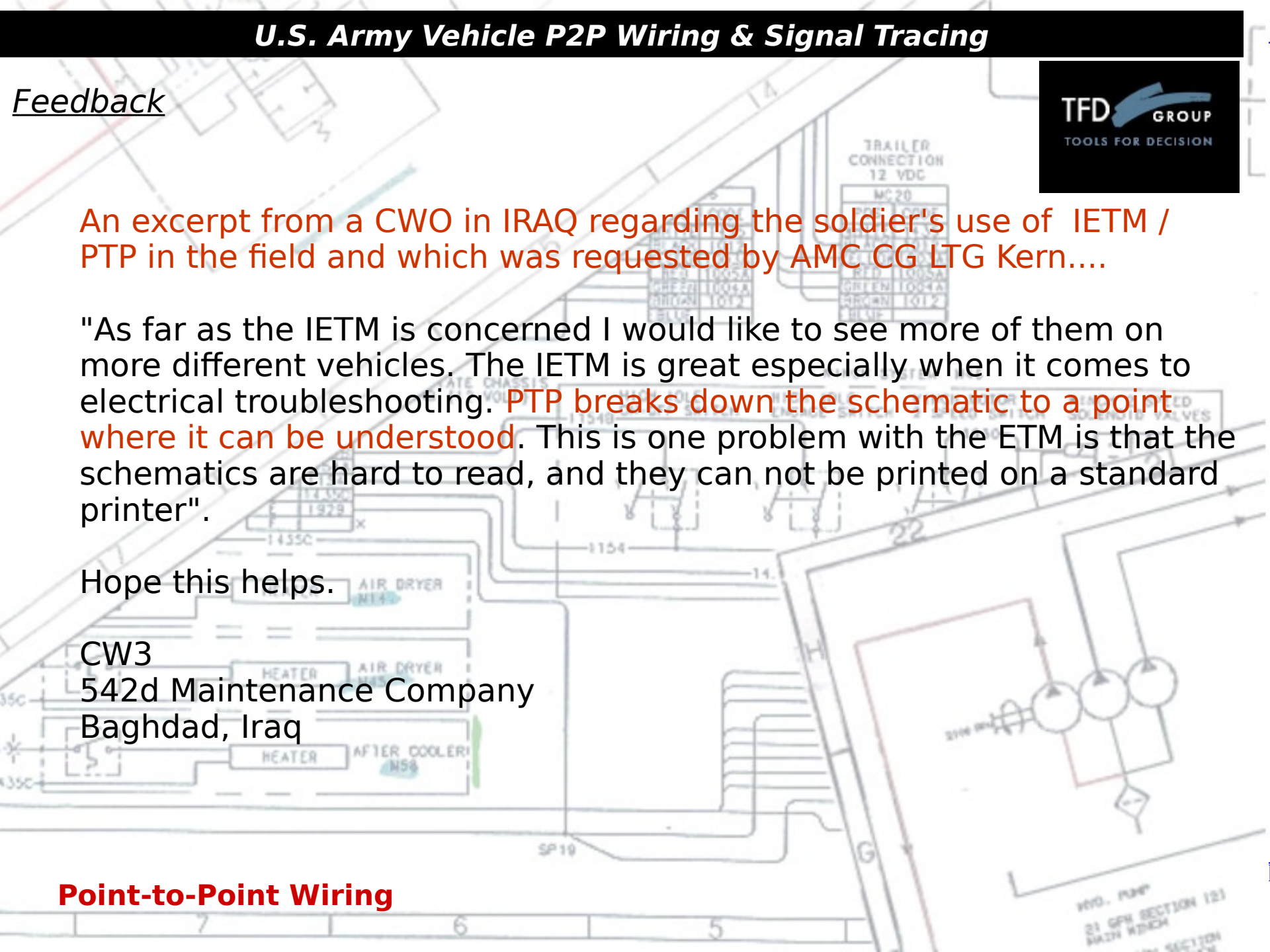
An excerpt from a CWO in IRAQ regarding the soldier's use of IETM / PTP in the field and which was requested by AMC CG LTG Kern....

"As far as the IETM is concerned I would like to see more of them on more different vehicles. The IETM is great especially when it comes to electrical troubleshooting. **PTP breaks down the schematic to a point where it can be understood.** This is one problem with the ETM is that the schematics are hard to read, and they can not be printed on a standard printer".

Hope this helps.

CW3
542d Maintenance Company
Baghdad, Iraq

Point-to-Point Wiring



CGM Level 4 Smart Graphics

□ **Apply CGM Level 4 intelligent graphic displays for foldout diagrams (without modification to content) to electronic circuits.**

1. All circuits, including electro-mechanical and electronic analog and digital components.
2. Color-highlighted components resulting from automated searches invoked by the maintainer ... correct foldout diagrams are displayed with selected components highlighted and centered.
3. Automated pin-to-pin wire/signal traces with selectable split-screen view ports.
4. Provide the experienced and inexperienced maintainer with the ability to manage and effectively control navigation throughout large, complex, multi-sheet foldout diagrams.

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Technical Strategy - General

- We use CGM -

❑ This style of P2P is based on the technology native to CGM Level 4 graphics. The intelligent capability of this established graphic standard is fully exploited in P2P. It is used to display hotspotted legacy wiring diagrams without change in content and to provide highlighted components, connectors, and pins. These diagrams, familiar to the maintainer, become the main focus of P2P for selecting source components, launching traces, and for general navigation.

“CGM Level 4 intelligent schematic presentations are the primary focus for information displayed to the maintainer.”

- We integrate a database -

❑ P2P rapid tracing speeds are achieved through the use of an integrated relational database containing pin-to-pin wiring information derived from legacy wirelists and/or authored traces.

Point-to-Point Wiring

Technical Strategy - General

- We integrate/link supporting data elements -

- ❑ P2P design allows full integration of metadata, either as embedded displays or as windowed objects overlaying the displayed schematic.

- We customize to the user's needs -

- ❑ The authoring tool, display features, and navigation functions are customized to accommodate the source information available for each system documented in P2P. Table data and information integrated with the legacy schematics can be extracted and used to populate the trace database to enhance or automate functions. These automated functions assist the maintainer and simplify operations normally performed to navigate, organize, or manage information presented in the system's schematic or higher level flow diagrams.

Functions, features, and format of the legacy diagrams are not lost to a rigid authoring or display process

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Technical Strategy

- ❑ Preserve existing diagrams without change to content or function.
- ❑ Provide intelligent, useful navigation features that benefit the maintainer.
- ❑ Port tabular data to a relational database. Provide user “point & click” action to view information unique to a selectable schematic function. Implement hypertext links between referenced diagrams.
- ❑ Include content authoring capability to allow the customer to maintain or create new smart CGM diagrams.
- ❑ Distribution via Web, LAN, or CDROM.

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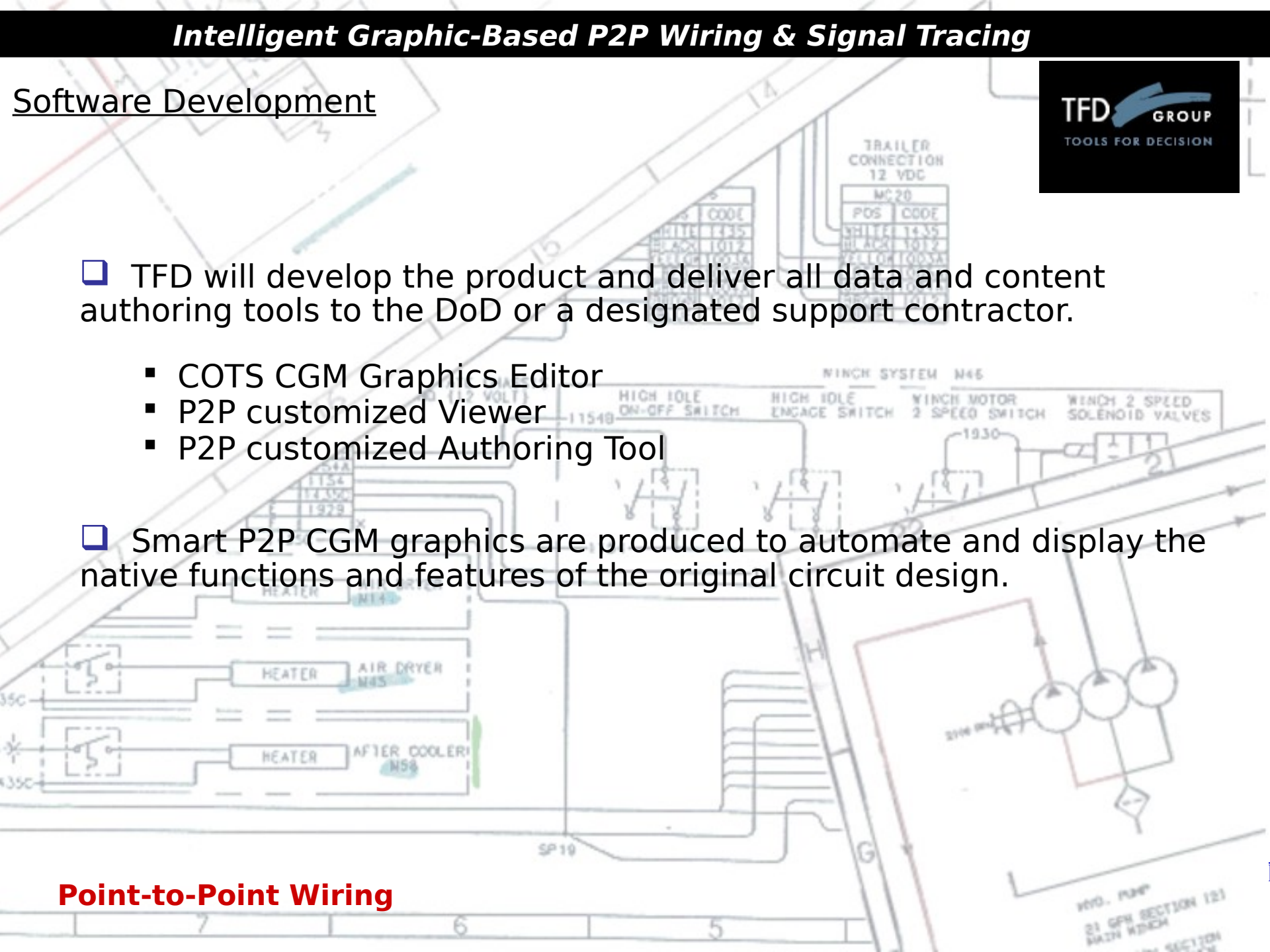
Intelligent Graphic-Based P2P Wiring & Signal Tracing



Software Development

- ❑ TFD will develop the product and deliver all data and content authoring tools to the DoD or a designated support contractor.
 - COTS CGM Graphics Editor
 - P2P customized Viewer
 - P2P customized Authoring Tool
- ❑ Smart P2P CGM graphics are produced to automate and display the native functions and features of the original circuit design.

Point-to-Point Wiring



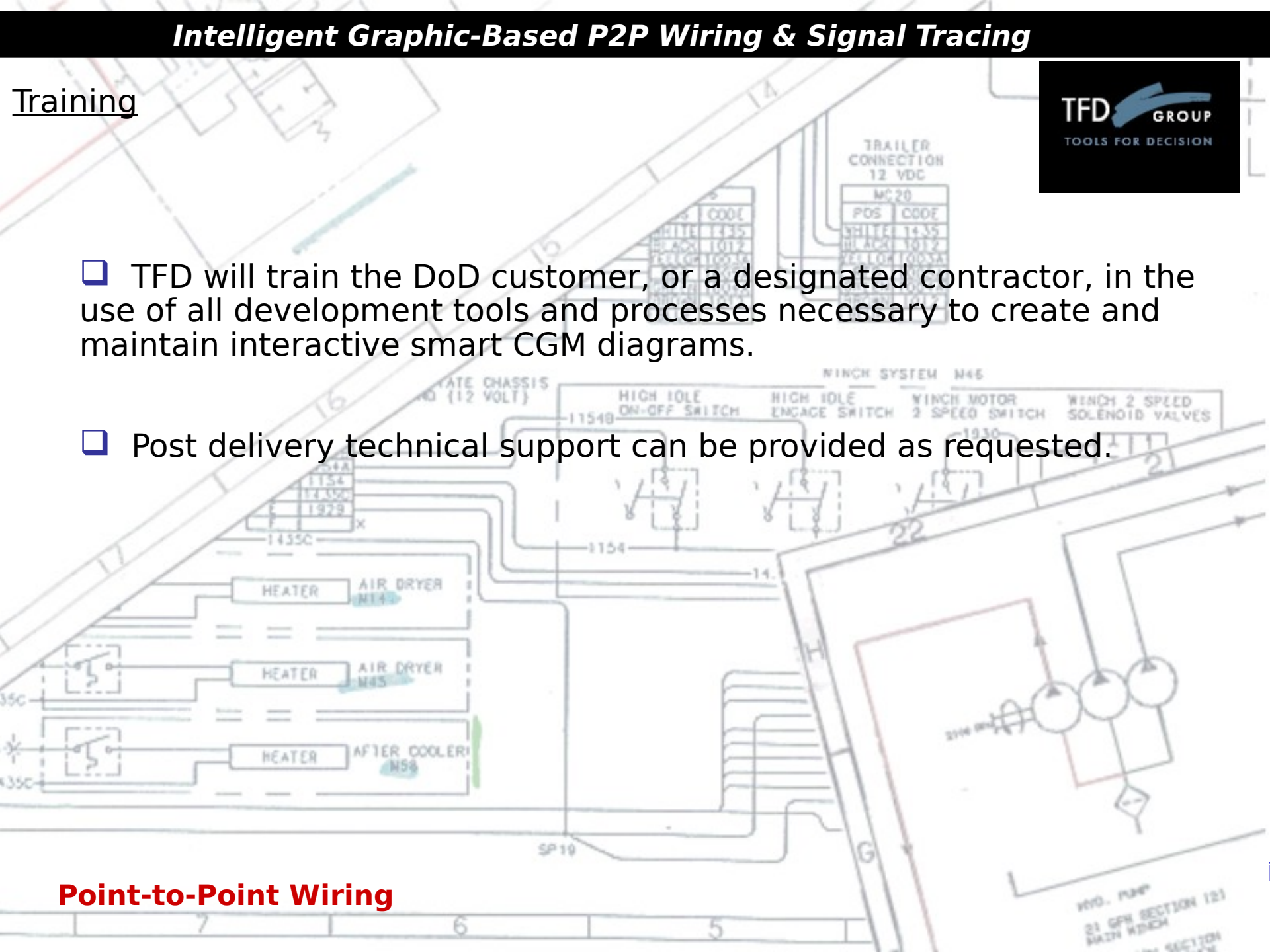
Intelligent Graphic-Based P2P Wiring & Signal Tracing



Training

- TFD will train the DoD customer, or a designated contractor, in the use of all development tools and processes necessary to create and maintain interactive smart CGM diagrams.
- Post delivery technical support can be provided as requested.

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Life Cycle Cost Benefits

- ☐ The maintainer will benefit through the use of familiar diagrams. The content and basic format of the diagrams will not change ... decreased training.
- ☐ Information access speed to schematic information by the maintainer can be increased by more than 50 percent ... decreased MTTR.
- ☐ Increased system operational up time.
- ☐ Information distribution by Web, LAN, or CDRom will save system O&M dollars.

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